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ABSTRACT

A spindle for a grinding wheel which is to grind re-entrant cams on camshafts is described, comprising a drive motor, a shaft extending from the motor at the end of which is mounted a grinding wheel, and a rigid elongate casing extending from the motor and encasing the shaft. The length of the shaft and casing is selected to be at least as long as the axial length of cam shafts to be ground by the wheel. The shaft is carried in three hydrostatic bearings. One bearing is located near the grinding wheel at the end of the rigid casing remote from the motor. The assembly increases the shaft stiffness and its resistance to bending. A second bearing is located at the inboard end of the shaft and the third bearing is located within the motor at the far end of the shaft. The length of the rotor-bearing part is shorter than the external part of the shaft, which is constructed so that the stiffness and the support of the shorter part of the shaft dictate that the bending resonance of the longer external part is above the critical spindle rotational frequency. The motor housing is symmetrical and includes a water cooling jacket in which water follows a helical path around the motor, to avoid cooling one side of the motor more than another. The spindle is constructed to be axisymmetrical, so that any heat generated within the bearings dissipates radially and uniformly into the surrounding material. Oil is supplied under pressure to the bearings by a pump from a reservoir to which oil returns from the bearings. The oil is heated in each bearing and the heated oil drains into lower regions of the enclosure formed by the shaft casing and motor housing. The lower regions of this enclosure constitute a separate oil collection box mounted so as not to strain the shaft. A thermal barrier is provided between the upper and lower regions of the enclosure. During assembly the internal bores of two of the bearings are initially aligned and the third bearing is adjusted radially to bring all three bores into alignment.